1899

HISTORY OF ACTIVITIES ON THE EUROPEAN PINE SHOOT MOTH IN THE NORTHWEST 1/

1959 Surveys and Control

a. Moth discovered at Bellevue, Washington.
b. Puget Sound area found to be infested.

1960 Surveys and Control

a. Community surveys--Washington and Oregon.
b. Many western Washington communities found infested.
c. Portland surveyed--infested trees found.
d. Spokane surveyed--infested trees found.
e. Forest nurseries surveyed--no infestations.

Research

a. Ponderosa pine seedlings from Oregon planted in Michigan to test susceptibility.
b. Western Washington Experiment Station began insecticide testing.
c. U.S. Forest Service, with Agriculture Research Service, began fumigation tests to expedite quarantine.

1961 Surveys and Control

a. Spokane surveyed--infested trees destroyed.
b. Western Washington surveyed--infestations found at several outlying communities and destroyed.
c. Widespread infestations Puget Sound area--eradication impractical.
d. Oregon surveyed--infested trees at Salem and Eugene destroyed.
e. Kelowna, B. C.--infestation found.

Research

a. Field tests on fumigation of individual trees completed.
b. Commercial nursery fumigated on test basis.
c. Fumigation schedules established.

1/Prepared for Northwest Forest Pest Action Council, Executive Committee, February 16, 1970.

Quarantines

a. Oregon, Washington, Idaho, Montana, Hawaii and Utah established interstate quarantines. Washington established intrastate quarantines.
b. Oregon and Washington legislatures gave forestry departments authority to perform surveys in urban areas.

1962 Surveys and Control

a. Washington--four infestations destroyed.
b. Washington--infestation found in native lodgepole pine stand.
c. Washington--surveys continued in Puget Sound area.
d. Washington--Spokane clean 1 year.
e. Washington--nursery tagging of uninfested trees began.
f. Oregon--Portland infestation eradicated.
g. Oregon--Salem clean 1 year.
h. B. C.--Kelowna, infested.

Research

a. Fumigation of nursery beds and baled nursery stock tested and now in operational use.
b. Lindane in DMSO found to be ineffective.
c. Western Washington Experiment Station spray tests completed. Parathion, diazinon, and Sevin gave good control. In North Central States Zectran and Cygon also gave excellent control.

Quarantines

a. Containment zone established in northwest Washington to minimize spread.
b. Bill to reimburse owners for pines destroyed in Portland and Salem introduced in State legislature. Bill not supported by nursery industry.
c. California and Nevada established interstate quarantines.

1963 Surveys and Control

a. Washington--no infestations found outside containment zone.
b. Washington--Spokane clean 2 years.
c. Oregon--Portland infestations destroyed.
d. Oregon--Salem clean 2 years.
e. B. C.--Kelowna, Westbank, Penticton and Summerland infested in central B. C. Lower Fraser River communities also infested.

Research

a. Natural controls found ineffective.
b. Dispersal study showed 253 foot flight by mated females.
c. Vacuum fumigation of bagged and baled trees found effective.

1964 Surveys and Control

a. Washington--infestations intensified in Puget Sound area.
b. Washington--community surveys outside containment zone negative.
c. Washington--Spokane clean 3 years.
d. Oregon--Portland infestations destroyed.
e. Oregon--community surveys negative.
f. Oregon--Salem clean 3 years.
g. B. C.--infestations present in interior communities and in lower Fraser River communities.

Research

a. Biological characteristic studied to pinpoint problems for intensive study.
b. Bud characteristics of ponderosa pine that might effect shoot moth attack identified.

1965 Surveys and Control

a. Washington--Washington State Department of Natural Resources assumed administration of Statewide surveys.
b. Washington--Christmas tree plantations near Olympia infested.
c. Washington--infested trees shipped to Omak, Kettle Falls and Klickitat. Trees destroyed.
d. Oregon--new infested highway planting found in Portland and destroyed. Other survey results were negative.
e. B. C.--low level infestations continued in the interior and on the coast.

Research

a. Evaluation of irradiation for the sterile-male technique of biological control commenced at Washington State University.

b. Mating and sex attraction studies commenced.

c. Artificial diet being developed at Washington State University.
d. Emergence pattern studied on mugho pine.
e. Outplantings of Oregon ponderosa pine in Michigan evaluated for relative susceptibility to shoot moth attack.
f. Larvae found to successfully overwinter at Vernon, B. C. on native ponderosa pines.

1966 Surveys and Control

a. Washington--Puget Sound infestation intensified and spread southward.
b. Washington--spot infestations found at Longview, Prosser and Port Angeles.
c. Washington--Statewide surveys outside containment zone negative. Christmas tree plantations negative.
d. Oregon--Oregon State Department of Forestry assumed responsibility for Statewide survey.
e. Oregon--infested pines at a Portland Nursery brought into State in violation of State quarantine. Shipment was destroyed.
f. Oregon--Residential survey in Portland negative for the first time since 1961.
g. B. C.--infestations more widely distributed in the Okanagan Valley and coastal B. C.
h. California--infested trees from Portland intercepted and destroyed.

Research

a. Pine seedlings sent to Elmira, Ontario to test susceptibility to shoot moth attack.
b. Overwintering larval study at Vernon, B. C. continued.
c. Research at Washington State University to develop sterilizing technique continued; development of artificial diet completed.
d. Biochemical factors of host resistance--a grant research project at Michigan State University.
e. An improved technique for mating European pine shoot moth in the laboratory developed.
f. Response of European pine shoot moth males to the female sex attractant was almost 100 yards in one test.
g. Ethylene and propylene glycols were effective as additives to extend life of attractant extracts.
h. Daily emergence of adults on Scots and mugho pines for daily peaks of emergence and sex ratios tested. Mugho pine had a secondary afternoon peak in emergence, as also recorded for Ontario.

i. Dispersal of adult males to host trees, in the absence of females, was as far as 150 feet.

1967 Surveys and Control

a. Washington--new infestations in western Washington outside containment zone destroyed. Eastern Washington infestations found at Kennewick, College Place and Walla Walla, but not controlled.
b. Washington--more Christmas tree plantations near Olympia infested.
c. Washington--infestation in Port Angeles and Longview fumigated.
d. Oregon--massive infestations found in the Hermiston area.
e. Oregon--ornamentals at a Portland residence infested--destroyed. Several infested trees fumigated at a new housing development west of Portland.
f. Oregon--statewide survey negative, except for Hermiston and Portland.

Research

a. Improved technique for mating European pine shoot moth in the laboratory shown to provide over 70% mating with minimum handling.
b. Of several additives to the attractant extracts, four extended the attractiveness of baits by 8 to 14 days.
c. Characteristics to distinguish between mated and unmated European pine shoot moth females identified.
d. Adult emergence patterns of European pine shoot moth on Swiss mountain, lodgepole, Scotch, and Japanese red pines (potted trees) found similar, but females emerged ahead of males on lodgepole pine. Found a 2:1 ratio of males to females on Japanese red pine.
e. Differences in bud numbers and bud size on young ponderosa pines in different localities in eastern Oregon and Washington reported. Differences in resin canal development between terminal and lateral buds shown.

1968 Surveys and Control

a. Washington--infestations at Walla Walla were destroyed. The infestation at Kennewick was sprayed with four applications of Sevin.
b. Oregon--Hermiston infestations sprayed with Sevin and/or Cygon.
c. Oregon--statewide surveys negative, except for Hermiston.

Research

a. Washington State Department of Natural Resources funded research on systemic insecticide screening at Washington State University.
b. Natural sex attractants found promising as survey tool.
c. Cooperative research on sex attractant identification and synthesis with Oregon Graduate Center started.
d. Survival and potential damage tests began at Pringle Falls Experimental Forest near LaPine, Oregon, under cage conditions.
e. Male moth dispersal was random in relation to pine hosts.
f. Emergence pattern of moths on different pine species studied further.
g. Systemic insecticide screening underway by Washington State University at Puyallup, Washington.
h. A laboratory population of European pine shoot moth was continuously reared for 10 generations.

   Mortality of late instar larvae was reduced to less than 15 percent by the addition of aureomycin to the wheat germ diet. Sterility of males was reduced to about 25 percent by addition of fresh food at 3-week intervals.

i. Pine-reared males found to mate a maximum of 6 times and an average of 2.24 times.
j. Location and structure of the pheromone gland of female European pine shoot moth described.

1969 Surveys and Control

a. Oregon--infested trees at a residence in Portland were destroyed.
b. Oregon--large infestation in southwest Portland sprayed with four applications of Sevin.
c. Oregon--Hermiston infestations sprayed four times with Sevin.
d. Oregon--statewide survey negative except for Portland and Hermiston.
e. Oregon--infested nursery stock from within the containment zone in Washington shipped in violation of quarantines. The shipment was intercepted and destroyed in Umatilla County.
f. Washington-infested trees at College Place destroyed before moth flight.
g. Washingon--infestation at Kennewick controlled with four applications of Sevin.
h. Washington--statewide detection surveys negative, except for Kennewick and College Place.

Research

a. Parasite release at McNary Dam was promising as a knock-down method in an integrated control program.
b. Sterile-male control approach tested in Seattle.
c. Survival and damage tests on natural pines at Pringle Falls Experimental Forest continued.
d. Identification and synthesis of shoot moth sex attractant continued at Oregon Graduate Center.
e. Several systemic insecticides show promise for control of the shoot moth in tests made by Washington State University.